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ABSTRACT

This workshop was the first of two designed for the purpose of developing specific recommendations for a program of research on adolescent literacy. Together these workshops, jointly sponsored by government and private sector entities, will draw on the knowledge and experiences of researchers and practitioners who work with adolescents and their reading challenges. The March workshop brought together primarily researchers, but also some practitioners, to review and summarize the knowledge base and gaps relevant to adolescent literacy and to develop a research agenda. The format of the workshop was a combination of presentations by speakers, comments from panels of respondents, and open discussion from the audience. This summary report on the workshop contains the following sections: Rationale for the Workshop: Research Needs in Adolescent Literacy; Welcoming Remarks: The Threat and Challenge of Illiteracy; Profiling the Struggling Adolescent Reader: A New Perspective on an Enduring Problem; Adolescent Reading Development: Biological Factors, Predictions; Motivation for Development in Adolescent Literacy; Critical Factors in Instruction--What Should We Be Teaching?; Designs to Study Adolescent Readers; and Designs for High-Quality Interventions. (NKA)

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Adolescent Literacy—Research Informing Practice: A Series of Workshops

Summary of the Adolescent Literacy Workshop: State of the Science and Research Needs

This workshop was the first of two designed for the purpose of developing specific recommendations for a program of research on adolescent literacy. Together these workshops will draw on the knowledge and experiences of researchers and practitioners who work with adolescents and their reading challenges. The March workshop brought together primarily researchers, but also some practitioners, to review and summarize the knowledge base and gaps relevant to adolescent literacy and to develop a research agenda.

The workshop was jointly sponsored by government and private sector entities: the National Institute of Child Health and Human Development, the American Federation of Teachers, the American Speech-Language-Hearing Association, the International Reading Association, the National Education Association, the National Institute for Literacy, and four Offices of the U.S. Department of Education: Vocational and Adult Education, Educational Research and Improvement, Elementary and Secondary Education, and Special Education and Rehabilitation Services.

The format of the workshop was a combination of presentations by speakers, comments from panels of respondents, and open discussion from the audience. On the third day, all attendees at the workshop participated in one of four small groups with the charge to identify the research questions of highest priority.

Rationale for the Workshop: Research Needs in Adolescent Literacy

Significant advances have been made in understanding the abilities young children must acquire to develop beginning reading skills and the conditions under which they are most effectively taught, but very little evidence is available on how these abilities are best acquired and taught during adolescence. Specifically, it is well known that in learning to read, kindergarten and elementary school-aged children must develop adequate alphabetic reading skills (including phonemic awareness and phonics abilities) and the ability to apply these word-reading skills fluently to both decoding and text-reading activities, and they must develop background knowledge, vocabulary, and reading-comprehension strategies to facilitate their understanding of what they read. But there are obvious critical influences that age and experience bring to the process of learning to read and write, particularly if basic reading skills are not developed prior to third grade. However, we do not know to what extent what is known about beginning reading instruction applies to older students who fail to acquire the building blocks of reading.

First, it has been frequently stated that learning to read may be more difficult after age 9. However, the factors that might explain this decreased learning ability are not well understood. Do older students make little progress even when provided intensive, explicit, and systematic instruction in the building blocks of reading that they have not yet acquired? If so, does this failure to progress reflect a biologically based critical period for the acquisition of reading-related abilities prior to age 9? Does protracted failure in learning to read in kindergarten and elementary school lead to declines in

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self-esteem, increases in negative peer interactions, and other emotional factors that reduce motivation? Are the necessary quality, duration, and intensity of reading instruction simply not available in the upper-elementary, middle, and high school years? Or are combinations of these and other factors responsible for this apparent resistance to reading intervention by middle and high school students?

Second, it is not well understood which specific reading abilities are most predictive of difficulties in learning to read in adolescence. Do the relationships between phonemic awareness, phonics, fluency, vocabulary, and reading comprehension that predict age-appropriate reading development from kindergarten through grade 3 apply to older students? For example, while it is known that phonemic awareness, letter and number naming, and print awareness predict word-reading skills in beginning readers, longitudinal studies indicate that older disabled readers' literacy limitations are better predicted by fluency and naming tasks. Is it the case that adolescents who have difficulties learning to read have mastered a threshold amount of word-reading skills but are unable to negotiate the demands of content-area reading because of limitations in rate, background knowledge, and vocabulary knowledge? Or could it be that they require sustained interventions over time that are not available to them?

Third, it is not well understood how adolescents can be motivated to learn to read, particularly when they have endured many years of failure. Thus, there is little information for middle and high school teachers about how best to present reading concepts and have students practice them in the environments typical to classrooms at these levels. Even if it were known which reading abilities are most critical for reading mastery during adolescence, research has not documented the most effective approaches to teaching those abilities.

Welcoming Remarks
The Threat and Challenge of Illiteracy

In welcoming remarks to the workshop participants, Dr. Carol D'Amico, assistant secretary of the Office of Vocational and Adult Education, U.S. Department of Education, described the issue of adolescent literacy as an urgent national challenge. Not only does illiteracy carry a personal burden for individuals but also it threatens national economic security. Dr. D'Amico also expressed the commitment of the current administration to addressing the national problem of low educational achievement and the gaps in achievement between income and ethnic groups. She presented a number of alarming statistics:

- In middle and high schools, the levels of achievement, especially for reading and math, decline between grades 4 to 8 and grades 8 to 12.
- Many high school graduates enter college unprepared in reading and math. In community colleges, 40 to 60 percent of freshmen need remedial courses.
- Data from international comparisons of 16- to 18-year-olds show that even the top 10 percent in the United States cannot compete with the top 10 percent of 16- to 18-year-olds in other industrial countries.
- And 25 percent leave school without a diploma. Many drop out because they cannot read well enough to do the course work. About 56 percent of Hispanics, African Americans, and students with disabilities do not finish with a diploma 4 years after they start. They see it as impossible to catch up, so they give up and drop out.
- The average 8th grader who is nonwhite or who is from a low-income family reads at three to four grade levels lower than whites and the more advantaged.

Dr. D'Amico pointed out that the lack of educational preparation resurfaces later as a lack of preparation for the next step of an individual's life. Though 65 percent of high school graduates

actually make it into college, about a third do not finish the first year. Many of these young adults spend the next 10 years floundering from job to job. They may start to get serious around age 28 or 29, and some try to go back to an adult or a secondary education program because it is indeed a ticket to a good job. The problem is that there will be more jobs than workers in the coming years when the baby boomers exit the labor market. This has implications for the Nation's standard of living and economic security.

Dr. D'Amico urged the workshop participants to identify a process, a context, or materials that will make a difference, and a plan to get those into the system.

Profiling the Struggling Adolescent Reader: A New Perspective on an Enduring Problem

Dr. Patricia Alexander, professor in the Department of Human Development at the University of Maryland, presented a theoretical model on competencies, based on 6 years of research profiling the adolescent learner. First, she proposed seven guiding premises on which to build theories and a research agenda:

- Reading is more than a set of skills or processes to be acquired or an aesthetic experience to be lived-through—it is an academic domain that ties together skills and processes that will serve the individual throughout life.
- The achievement of competence is a developmental, intricate, multidimensional, and interactive process.
- Early childhood/elementary models or academic interventions do not necessarily hold true for adolescent readers.
- Because acquiring literacy is developmental and complex, "struggling" can take multiple forms during adolescence.
- Despite their varied natures, struggling adolescent readers often share certain cognitive, sociocultural, motivational, and strategic characteristics.
- There are compounding, collateral effects for reading problems that persist into adolescence.
- The complexity of factors contributing to struggling adolescent readers demands a treatment "complex."

Dr. Alexander's model posits three stages of learning: acclimation, when the individual is beginning in a new domain; competence, which most should acquire between kindergarten and grade 12; and proficiency or expertise. What distinguishes development across time is the changing relationship between knowledge, interest, and strategic processing. During the acclimation stage, for example, knowledge is piecemeal, but becomes broader and deeper in the later stages.

Interest in reading can be situational, that is, momentary, established by the time and place, by a teacher who motivates the children at the beginning; on the other hand, it can be individual, that is, what is personal to the individual. A student who knows little about an academic domain is not personally invested in it and depends on others, such as the teacher, to make it interesting. In the competence stage, individual interest carries one forward toward expertise.

Strategic processing also develops in stages, with surface- and deep-processing strategies playing more or less important roles. For instance, surface strategies, which involve extracting meaning from text, are more indicative of readers in acclimation. By comparison, highly competent and expert readers rely increasingly on deep-processing strategies that entail the critical and analytical analysis of textual content. Ideally, the three elements of knowledge, interest, and strategic processing

enhance one another throughout reading development.

Dr. Alexander suggested that longitudinal studies are needed to identify the many combinations of stages and elements that occur and change over time among students. She proposed a model of six possible profiles of adolescent readers.

POSSIBLE PROFILES OF ADOLESCENT READERS

Highly Competent Readers

- Principled body of linguistic knowledge
- Sufficient prior knowledge of topic/subject matter
- Rich repertoire of surface- and deep-processing strategies
- Personal interest in reading or in topic/subject matter
- Goal-directed behavior

Effortful Processors

- Goal-directed
- Rely heavily on strategies in the face of linguistic difficulties or limited topic knowledge
- Have come to work "harder," if not always "smarter"

Knowledge-Reliant Readers

- Depend heavily on their existing topic-related knowledge to bolster their processing of linguistic information
- Relevant topic knowledge may have been acquired through direct experience or audiovisual channels.

Non-Strategic Processors

- Have few or faulty strategies for processing linguistic information
- Have limited understanding of task demands or demonstrate little occasion of self-regulation

Resistant Readers

- May have the requisite linguistic abilities, topic knowledge, and relevant strategies
- Lack either the "heart" or the "will" to activate the ingredients for success

Seriously Challenged Readers

- Have a complex of reading problems
- The complex of problems can include language-processing difficulties, limited background knowledge, strategic insufficiencies, and negative motivational conditions.

Discussion Period

During the open discussion session, several themes were expanded:

- A basic question is: What is driving developmental progress over time? Context helps to

shape and change motivation and progress over time. A bad context can do damage but a rich and supportive context will help a student advance. To move from acclimation to competence is possible if the student has either knowledge strategies or strong interest to rely on, but the movement to proficiency requires high levels of all of these underlying elements.

- There is an opportune moment when interest becomes a more powerful force in moving a student forward into the stage of competence. It is important for teachers to develop a sense of where students fit developmentally and how to link them to the subject matter, to tie situational topics to personal interest.
- The proposition was put forth that literacy cannot be meaningfully studied without studying writing. Writing externalizes the need to share, communicate, and reflect on ideas.

Adolescent Reading Development: Biological Factors, Predictions

Dr. Sally Shaywitz, professor of pediatrics at Yale University School of Medicine, presented a summary of her recent research on brain activity during reading tasks as monitored by functional magnetic resonance imaging (fMRI). She expressed the importance of using strategies and tools to understand reading at fundamental levels as a prerequisite to studying the cognitive factors involved with literacy. Characterizing the basic neurobiologic factors that influence reading and how those factors and behavior change over time will enable researchers to identify behavioral and neurobiologic targets for intervention.

A fundamental developmental question is whether reading disability persists in an individual. What is the nature of reading disability in children? In adolescents? What is the role of phonological analysis in adolescent readers?

An important tool for research studies is the prospective, longitudinal design. Such studies can assess differential outcomes and how they may be associated with behavioral factors. Dr. Shaywitz presented data from the Connecticut Longitudinal Study, which uses an epidemiologic sample of children followed from kindergarten in 1983 to grade 12 and to age 23 in 2002. The data from the study answered a number of questions.

- Did reading disability persist over time in the study? The growth curve models showed that both groups made progress over time, but the gap between good and poor readers did not close.
- What is the nature of reading and reading disability in children? In young school-aged children, a deficit in phonological processing was the most severe and the most specific finding.
- What factors predict reading disability in adolescents? What is the role of phonological analyses? Academic skills and cognitive abilities were measured, sociodemographic data were collected, and teachers rated school functioning. The measures that best predicted reading were phonological analysis (most predictive) and teacher assessment. The significant predictors of reading comprehension at age 15 were word-finding, vocabulary, digit span, and socioeconomic status. For differentiating readers with disability from average readers, the best predictors were phonological analysis, rate of reading, and spelling.

With fMRI, the brain at work can actually be observed and recorded. It is a tool for understanding what is responsible for phonological difficulties, for understanding the neurobiology of reading and reading disability. During fMRI scanning, stimuli are presented visually; the subject responds by

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pressing a button.

Functional MRI studies of adults revealed that the parietal-temporal region of the brain is activated during reading. Dyslexic readers, however, do not activate the parietal region but rather the front region of the brain. In fMRI studies, 144 children, ages 7-18, showed the same patterns. Furthermore, reading skill levels tested outside the fMRI scanner corresponded to the scan results.

Many children with reading disabilities improve in reading accuracy but remain slow readers, lacking automaticity. The scans show that readers with reading disabilities activate the inferior frontal gyrus on both sides; they overactivate the front of the brain. Thus, their accuracy improves because they develop compensatory pathways, but they cannot read fluently or rapidly because the pathway remains disrupted.

Dr. Shaywitz hypothesizes that there might be two types of poor readers. In the study, both types did well with familiar words—but one type had a lower ability to read unfamiliar words. The implication is that in reading familiar words well, the latter were not doing phonological analysis but instead were using memory. In nonimpaired readers, the left region was well connected to the parietal and to the frontal left. In the persistently poor reader, it was connected to the right frontal region, which serves memory.

The persistently poor readers had lower verbal ability and came from disadvantaged schools. The others had higher verbal ability and came from less disadvantaged schools. Dr. Shaywitz suggests that about one-third of the problem of reading disability is genetic, and two-thirds environmental. If so, this would be a strong argument for early and systematic instruction.

Response to Sally Shaywitz by Michael Kamil

In his commentary, Dr. Michael Kamil, professor of psychological studies in education at Stanford University, restricted his comments to two basic findings presented by Dr. Shaywitz: (1) that there is a group of persistently poor readers who can be identified early and who continue to have difficulty reading throughout school, and (2) that these readers can be differentiated in adolescence on the basis of phonological measures, but not on comprehension.

Dr. Kamil stated that the two observations introduce a dilemma. The report of the National Reading Panel found the effects of phonologic instruction to be limited in both effect and time. That is, phonemic awareness training is most effective in kindergarten and grade 1, but the effects fall off after about 25 total hours of instruction. Phonics is most effective in grade 2 and below. Above these grades, the effect of phonics instruction appears to fall off dramatically. The Shaywitz research puts phonological processing at the base of all reading skills and suggests that persistently poor readers need some sort of phonological remediation, but other research indicates that such instruction has little effect for the adolescent populations under consideration.

As an alternative, Dr. Kamil suggested looking at subgroups of readers in a conceptual matrix of four cells: early identified good readers (or statistically "normal") and poor readers as one dimension, and good or poor readers (ultimate success) as the other dimension. In this matrix, some poor readers succeeded; that is, they were identified as poor readers and were either misidentified or overcame whatever problem they had. There are also poor readers who remained so. In addition, some good readers later came to be in the poor group, and finally one group of readers remained good readers all along.

The critical groups are those two who switch from good to poor or poor to good, but all four groups

must be characterized. A longitudinal study with many interim measures would provide the necessary information. Those measures should include types of instruction that might have made the difference. The most promising of these instructional approaches or interventions should be evaluated in new contexts, with new groups of students. At that point, the data should indicate what is applicable to the problem of persistently poor readers.

Dr. Kamil raised two other issues. First, in the Shaywitz study, the readers were not differentiated on comprehension ability, an essential element of reading. This points to the need for the field to be very explicit about what is meant by reading in the context of adolescent reading. What does it include and what does it exclude? Such precision will be crucial for future studies. Second, the Shaywitz studies, and many other similar studies, do not include in their design second-language populations; those students also are of urgent concern and research including or targeting such groups is important.

Response to Sally Shaywitz by Hugh Catts

In his comments, Dr. Hugh Catts, professor in the Department of Speech-Language-Hearing at the University of Kansas, acknowledged that Dr. Shaywitz's finding on the persistence of reading disabilities is consistent with numerous other studies. This body of research indicates that about 60 percent of children with early reading disabilities have reading deficits at follow-up several years later. This is a high rate of persistence given that another 20 percent of these children may be borderline poor readers at follow-up.

Research also confirms that individual differences in phonological awareness are highly predictive of subsequent reading achievement. However, Dr. Catts argued that once children have begun school, the best predictor of reading achievement is reading itself. In a longitudinal study of approximately 600 children, he and his colleagues showed that grade 2 word-recognition abilities accounted for about 80 percent of grade 4 word-recognition abilities. Grade 2 word-recognition abilities also accounted for a large amount of variance in grade 4 reading comprehension. However, grade 2 abilities in listening comprehension explained considerable additional variance in reading comprehension. In other words, as children progress through school and are required to read more difficult text, their ability to comprehend language becomes more critical. Dr. Catts argued that there is also good reason to believe that language abilities play a similar if not greater role in adolescence. As a result, to adequately address reading problems in adolescence, attention should be given to improving language comprehension.

A focus on language comprehension might also help explain late-emerging poor readers. Dr. Catts and his colleagues found that about 20 percent of poor readers in grade 4 were not poor readers in grade 2. In other words, these children might be experiencing the "4th grade slump." Further examination showed that these children had good word-decoding skills, both in terms of speed and accuracy, but had poor listening comprehension. Dr. Catts and his group are now following these children in grades 8 and 10. Their work is focusing on factors that might be related to deficits in listening comprehension.

Discussion Period

During the open discussion period, the following comments were made:

- It is important to distinguish between phonological awareness, which is a clinically administered measure, and phonics, which is an instructional method. Phonological measures rely on short-term memory through which all language-processing passes. One study was said to have demonstrated that students with reading difficulties have phonological short-term

memory deficits, but that phonics may still be an effective early intervention.

- How do the fMRI data reconcile with data on structural differences? Many structural studies had a small number of subjects and when the data were controlled for age and gender, there were no differences. It will be interesting to continue to follow the data on structural and functional imaging as the numbers of individuals being studied increases, especially if common protocols are used and subjects can be pooled in some way.
- At least four types of poor readers have been identified. Do the types hold up for diverse students? What contributes to the categories? What are the implications for interventions? And are these the only types or profiles? There seem to be many ways to subcategorize or profile poor readers, and research should test how well subcategories explain the variation among poor readers and what implications they have for intervention.

Motivation for Development in Adolescent Literacy

The field of reading is a broad mosaic and can be studied from many angles. Highlights of the research literature presented by Dr. John T. Guthrie, professor of human development at the University of Maryland, show that in addition to low achievement, struggling adolescent readers have low motivation for reading, that is, they are disengaged from literacy. The lack of motivation to read is a serious and multifaceted problem among adolescents. The factors involved include not only personal attributes of the students, but also instructional attributes and practices of teachers.

In middle school, struggling readers who are unmotivated tend to have the following characteristics: low confidence in their reading ability (low self-efficacy), low confidence in their ability to improve their reading, extrinsically rather than intrinsically motivated (they respond to rewards and incentives), unlikely to read for their own enjoyment or curiosity, feel socially marginalized and disrespected and therefore uncomfortable in school (they want to avoid looking bad and find ways to protect their egos), may nevertheless be interested in other subjects.

It is a challenge to engage the struggling reader, but a number of instructional practices can motivate reading. Empirical research substantiates the following observations:

- Classroom goals set by the teacher influence the students' goals. If learning is a primary aim of the teacher, the students will internalize that value. If getting a task done quickly is important to the teacher, that will become the students' reason for doing something.
- Support for learner autonomy and control increases intrinsic motivation. Teachers can accomplish this by involving students in decisions-for example, give them choices and decisions about what they will do for their homework, what story to read, or how to compose a response to a story.
- Teacher involvement can show students that the teacher knows them and knows what they need to learn.
- Setting short-term goals and tasks increases self-efficacy and is crucial for low learners. For example, have the student read one paragraph and write a sentence about what that paragraph means in the story before going on to the next paragraph.
- High effort fosters a sense of control and accomplishment: I succeeded because I worked at it, or failed because I didn't put in the effort. A student who believes achievement is attributable to luck will not keep at it.
- Avoid requiring that teachers use student performance as goals rather than learning goals. In one study, students enjoyed their work when the teacher used a learning goal, whereas students turned off and got worse when teachers had performance goals and became procedural.

Teachers make the following observations about what facilitates motivation for reading in students:

- Hands-on activities: Create situational interest—use a hook to get students' attention.
- Interesting text: There are a lot of characteristics to an interesting text.
- Collaboration: Involving the student feeds into adolescent social goals.
- Personal relevance—Materials and teachers should show why the students should care and how the information will help them.
- Meaningful choices: Allow the learner to have some control.

Dr. Guthrie presented as his opinion that optimization is everything, but research does not indicate how much or what level of autonomy is optimal. It is important to give students choice, but too little choice is deadening and too much is frustrating. He also stated that knowledge about performance is needed: what the teachers and students are doing.

Dr. Guthrie identified a number of barriers to reading motivation based on a mixture of practitioner observations and research:

- School size is large, which results in low teacher involvement with students, lack of student relatedness, and weak social goals. The teachers have too many students, and cannot know the students and therefore cannot motivate the students.
- Textbooks are formidable, monolithic. An alternative to the traditional type of textbook is to teach through trade books. The problem, however, is that there are five levels of reading in any grade level. It would be a challenge to provide books with the various levels of reading difficulty and content density.
- Departmentalization of subject matter works against incorporating reading skills.
- Teacher/curriculum-centeredness: Middle school students are seeking identity, but the school is teacher-centered rather than learner-centered.
- Accountability for content coverage: Mandated curricula drive out learner control.

Research studies and practitioner observations on reading motivation indicate the need for studies based on an engagement hypothesis that links cognitive strategies with motivation. Variables that would be included are subject matter knowledge, questioning, graphic organizing, summarizing, comprehension monitoring, searching, intrinsic motivation, integrated learning goals, self-efficacy, performance-approach goals, and social goals. Dr. Guthrie suggested that, in experimental study designs, these variables be taken into account in developmental and descriptive studies of cognitive and motivational strategies. Each strategy should be studied as a dependent variable, and developmental benchmarks for each strategy are needed.

Response to John Guthrie by Donna Alvermann

Although concurring with Dr. Guthrie that experimental studies are needed, Dr. Donna Alvermann, UGA Distinguished Research Professor in the Department of Reading Education at the University of Georgia, emphasized that experimental studies alone are not sufficient. Understanding the data produced by such studies requires doing qualitative research as well (e.g., case studies). Qualitative research enables one to look in depth at the various contexts in which literacy occurs naturally outside of formal school learning. Such research is essential because outside the school setting, children often exhibit a number of literacies that extend and enrich the more narrowly based print literacy associated with school learning.

While not in the formal learning environment, people are still in situations requiring literacy. In those situations, where they do not have to acquire knowledge, their levels and sources of motivation for reading may be very different from those in the classroom. Dr. Alvermann said that it is important to

think of children and adolescents as they actually are today. Her own research studies of children after school, in such settings as the library, showed that these students of the Net Generation are quick to find Internet sites and understand complex materials; for example, they make predictions and inferences from Japanese cartoons. These children, who scored in the lowest 25 percentile on a standardized reading test, can read some materials when they are motivated to do so. They often use strategies that differ from those introduced in formal school settings. She recommended that to reach resistant or reluctant readers, including English-language learners, teachers incorporate students' interests from out-of-school settings.

Response to John Guthrie by Donna M. Ogle

Dr. Donna M. Ogle, professor in the Reading and Language Development Department of National-Louis University, commented that it is important to disaggregate data to understand what the needs of different groups and subgroups are and what more must be made clear with research. There are two important sources of data that can be analyzed—the 1998 National Assessment of Education Progress Survey and the 2000 Program for International Student Assessment (PISA). Disaggregated data give different profiles of students than do aggregated data. For example, PISA data show that in Korea students are not interested in reading but do nevertheless score high in reading, and they are high achievers in mathematics and science. Aggregated data rank Germany quite low, but disaggregated data show an effect of recent immigrants educated in other countries. Immigrants beyond the first generation score higher, as a result of schooling in Germany. Finland, in contrast, has a homogeneous culture and is at the top of the list. Dr. Ogle suggested disaggregating data by several factors, including culture, first language, family groups, and social expectations.

Response to John Guthrie by Douglas Buehl

Douglas Buehl, a reading specialist at Madison East High School in Madison, Wisconsin, commenting from the point of view of the practitioner, noted that self-identity relates to motivation. He said that it has always been socially acceptable for adolescents to admit they struggle with math and science (because these are considered difficult subjects) or with history (because it is considered boring). However, it is not acceptable for students to admit that they do not read well. The student who does not read well may not be motivated to try. As a result, many struggling adolescent readers lack sufficient practice in reading because they avoid reading whenever possible. Therefore, teachers must help students understand why they need to learn something. One approach would be to find the bridge between other subject areas and literacy activities—for example, to teach students to read and communicate about science—yet there is typically a mismatch between the reading ability of the struggling reader and the textbooks used for the subject area.

Discussion Period

During the open discussion period, the following comments were made.

- The Department of Education is supporting two initiatives related to culture and literacy. (1) The Office of Educational Research and Improvement (OERI) has contracted support to convene and manage a national literacy panel that will assess the body of research on culturally and linguistically diverse students. (2) In a partnership, the NICHD and OERI support the Biliteracy Research Network, which is researching many factors, including cultural and parental factors, that may have an effect on Spanish-speaking students' development of English literacy.
- Very little transfer occurs from academic researchers to practitioners. How does the information get out? Dr. McCardle responded that the workshop's information will be in a report on the Web and there will be a practitioner workshop. The Department of Education will

take the lead for disseminating suggestions for practice.

- Engagement is a pathway to success in reading and can sometimes be achieved over a relatively short period. Although it cannot be achieved in a day, it could be fostered in a month in a series of activities. Engagement is not an attainment in itself, but rather a process that can be a link to cognitive outcomes. Most state assessments require comprehension of extended text. Use of an engagement model in the classroom that maximizes the students' engaged reading during the preceding 6 months can help to achieve the comprehension goal.
- The more the proliferation of testing, the less students may engage. The grade 12 results of the National Assessment of Education Progress test may be useless because the students do not take it seriously. Also, the time of year the test is given can have an influence. There is no definition of "below basic." Grade 4 students are below basic in reading yet in the first tier in the world in science. Some work needs to be done to reconcile these findings. Look at National Academy of Education study.
- Dr. Guthrie underscored the need for measurement. In comprehension, measurement is weak, not grounded in items. For grades 3 to 8, there is only norm-referencing testing, which is very limited.
- One person commented that high school students do not take the tests seriously, yet teachers teach to the test. Another stated that teachers tend to be so busy preparing students for assessment that it could preclude long-term research in the classroom.
- Engagement depends on the types of tasks students are asked to do. They should have choice in what they do, but also the tasks must be well designed.
- The nature of the reading task must be concept-oriented. Children do not read to enjoy phonemic analysis; they read for content. Content should be understandable, and important to them, but it does not have to be totally personal to them. Children have a need to understand and they get invested if the understanding comes through text.
- There is urgency associated with the issue of accelerating literacy in grade 9. There is now an investment in transforming high schools but some of the students are reading at the grade 3 level. While research is designing and testing effective interventions, practical advice is needed.
- To understand African American students, we should look beyond the mean and look at a range. Make comparisons. Look at the high achiever in the low-achieving school—what is influencing the highest achiever in the low school?
- A comparison is needed of motivation between early and later years. Certain aspects of motivation become more stable over time, such as self-efficacy. Motivation becomes a stronger challenge later.
- Some research should focus on linking personal and situational interests. Who are adolescents outside the classroom? Adolescents are interested in popular culture; they spend most of their time engaged with popular tasks, not linked to school topics. How can these be merged?

Critical Factors in Instruction-What Should We Be Teaching?

Dr. Donald D. Deshler, professor of special education and director of the Center for Research on Learning of the University of Kansas, began by describing four major challenges surrounding literacy instruction for underachieving adolescents:

- Teachers face great pressures to teach large amounts of complex curriculum content.
- Finding time in the secondary school curriculum to deliberately teach literacy competencies (in reading, writing, listening, speaking, numeracy, and academic content areas) is difficult.
- Secondary teachers do not typically think of literacy acquisition as being central in their instructional domain.
- Adolescents with literacy problems often lack hope, purpose, and self-esteem.

Dr. Deshler recommended reframing the question to be more inclusive than merely "what" we should be teaching. In addition to the question of "what," researchers must consider (1) the effects of the complex context of secondary schools, the effects of adolescent development, students' learning histories, and roles of secondary teachers, (2) how to teach skills, strategies, and content to adolescents with literacy problems, and (3) what constitutes effective instructional environments for promoting adolescent literacy in high school settings.

Regarding what to teach, Dr. Deshler presented a framework that researchers at the University of Kansas Center for Research on Learning have used for conceptualizing adolescent literacy instruction. This framework, the Content Literacy Continuum, considers both student needs and the realities of secondary schools. Additionally, the five levels of this continuum acknowledge the different views regarding content literacy and adolescent literacy.

Content Literacy Continuum
Level 1: Ensuring mastery of critical content in rigorous general education classes
Level 2: Weaving learning strategies within rigorous general education classes
Level 3: Supporting mastery of learning strategies for specific students
Level 4: Developing intensive course options for students who lack foundational skills
Level 5: Developing intensive clinical options for language intervention

Dr. Deshler delineated three major domains of instructional variables that have been found to characterize effective instruction and should be the defining attributes of how-to skills, strategies, and content to promote adolescent literacy:

1. responsive instruction: continuous assessment, instructional accommodations, and elaborated feedback;
2. systematic instruction: structured instruction, connected instruction, scaffolded instruction, and informative instruction; and
3. intensive instruction: sufficient instructional time, high student engagement in the learning process.

Effective instructional environments for promoting adolescent literacy consist of at least three factors: (1) clarifying the roles and expectations of teachers, (2) supporting collaboration among general education teachers and support staff and across teachers, and (3) creating an environment that strongly values literacy and strategic approaches to learning.

Dr. Deshler asserted that any research agenda on adolescent literacy should focus on at least four outcome measures in the process of validating instructional interventions: (1) statistical significance, (2) social significance, (3) palatability of the intervention for practitioners, and (4) scalability of the intervention. The following are the pressing research needs he presented.

- Identify effective ways of teaching adolescents at emergent and early stages of literacy.
- Validate instructional systems for effectively teaching learning strategies within academically diverse content classrooms.
- Design instruction systems for blending explicit and implicit instructional models in the instruction of process and content.
- Create school environments that are conducive to effective literacy instruction.
- Develop strategies for effectively aligning adolescent literacy instruction with successful outcomes on state assessments.
- Validate professional development approaches for educating secondary teachers in effective content teaching that is sensitive to language and literacy needs of struggling adolescents.

Response to Don Deshler by Sharon Vaughn

Dr. Sharon Vaughn, Mollie V. Davis Professor and Director of the Texas Center for Reading of the University of Texas, presented insights gained from two studies and from working with students. In helping students who are behind, the center provides three types of services: tutoring to get them through subjects, providing them with strategies as tools to enhance their access, and providing instruction in basic reading skills.

In one of the studies conducted last year, the researchers worked with 20 middle school students whose reading was below the grade 3 level and who had been identified as learning disabled. At the beginning, the students seemed disengaged and not interested in reading, but later their drive to learn to read became apparent. Dr. Vaughn noted that they would do anything to learn as long as no one else knew—confidentiality was prime. It would be too humiliating to have others know. They actually craved learning to read and perceived it as essential to their future success. They could not identify a single book, poem, or article that they enjoyed reading or having read to them. Dr. Vaughn was impressed with the vulnerability of these students over time, and with how willing they were to tackle the job of learning to read.

In the second study, the researchers worked with 22 high school students below grade 3 reading level who had been identified as learning disabled. An intensive intervention program was conducted—one group learned to spell and learned words primarily through writing, one group learned to spell and learned words primarily through tracing, one group was a control group. There were 23 sessions of 25 minutes duration each. With the intervention, the writing and reading groups made noticeable gains in reading words compared to the control group.

Response to Don Deshler by Cheryl Scott

Dr. Cheryl Scott, a visiting professor in communication sciences and disorders at Northwestern University, emphasized the need to design interventions that take into account individual differences. Adolescents fail as readers for different reasons and for different combinations of reasons. Readers must attend, read accurately and fluently, parse sentences, construct propositional text, construct mental models, generate inferences, and monitor comprehension. Syntax of sentences is Dr. Scott's specialty area and she noted that the processing of written sentential syntax is a challenge distinct from listening because of a variety of structural differences between the two modalities. Two particular features in written sentences were highlighted:

- the tendency for the main subject and verb to be either delayed until the end of the sentence or interrupted by intervening words, and
- the frequent occurrence of long, complex noun-phrase (nominal) constructions with considerable pre- and post-modification of head nouns.

Using a case example, Dr. Scott illustrated that an adolescent reader might have a distinctive problem parsing and thus understanding these types of written sentences. She noted that equally distinctive types of problems could occur for other components of the reading process, and that a "one size fits all" approach to intervention is unlikely to succeed. The development of true clinical markers for specific difficulties with component parts of the reading process is a necessary prerequisite for designing meaningful interventions.

Response to Don Deshler by Annemarie Palincsar

Dr. Annemarie Palincsar, Jean and Charles Walgreen Professor of Reading and Literacy at the

University of Michigan, recommended reframing the research question regarding instruction. Instead of "What constitutes effective environments for literacy instruction?" ask "What constitutes effective *instructional* environments for literacy *learning*?" and "What constitutes effective *instructional environments* for promoting deep *understanding of subject matter and literacy knowledge and skills*?" She based her rewordings on the assumption that reading, writing, viewing, and oral language are all integral to the process of developing deep understanding of subject matter. Dr. Palincsar urged that future research on adolescent literacy include the study of adolescent literacy learning in enriched learning environments, and suggested that such environments have the following characteristics:

- The teacher and students participate in a learning community.
- Knowledge is communicated in multiple ways.
- Students engage in problem-solving through activity.
- Coming to know is viewed as a recursive process in which knowledge and reasoning are refined over time.
- Texts are conceived of and used as tools.
- Teaching practices to mediate individual student learning are common and are employed strategically in the service of targeted learning goals and the maintenance of a learning community.

She reported on research conducted as part of the Research Institute to Accelerate Content Learning through High Support for Students with Disabilities in Grades 4-8 (REACH). The research began with the preparation of case studies of identified students in inclusion classrooms engaged in inquiry-based science instruction. The classroom teachers then read and interpreted the case studies for the purpose of identifying ways of addressing the print literacy, cognitive, social/relational, and attention challenges experienced by the students. After identifying appropriate interventions, a 2-year study revealed that all students—typically achieving, low achieving, and identified—profited from the interventions, as measured by assessments of conceptual understanding and scientific reasoning.

Discussion Period

During the open discussion, the following comments were made.

- The presentation and comments indicate that there is an emerging body of knowledge about learning and that the implied questions are why, when, and what teachers should be teaching - and how. The field is good at tracking student achievement, but not instructional change over time. Research methodologies are needed for this. We need to study what teachers learn and what research-based knowledge about instruction is needed?
- What kind of evidence is needed from research in order to make judgments about the quality of instruction?
- These presentations integrate research with the reality of schools. Philadelphia is now negotiating with the state because of scores on standardized test scores. Urban areas have a hard time attracting teachers, and teachers are retiring. How do you get this information to practitioners and new educators to put best practices into place from the beginning?
- The mechanism for change must be as close as possible to the schools. Teachers cannot teach from a journal article; thus, a group is developing hands-on articles with a focus on systems changes and teacher-guided professional development. The one-shot staff development approach does not work.
- It takes several years for teachers to begin to have an effect; therefore, programs must be funded for longer time periods.
- How many checks should be done over what time period? Checking the elements under different conditions is as important as the frequency—the day of the week, hour of the day.

Will the instructional method be maintained—after the summer, for example, or when other things get put on the teacher's plate?

- Information exists about many aspects of reading instruction, but not about what is true for every child. Some principles can be applied across subject domains. Teachers have 25 students in front of them and are expected to come up with one model that works for all.
- Look at the interaction between performance on different kinds of tasks performed by students, and then look at their ability to apply that in a new context, i.e., generalization of application. When we are doing research on instructional events, we have a checklist of important elements of the routine at various phases of the instruction. We assess how many elements are present and how much we can deviate from that and still get acceptable effects.

Designs to Study Adolescent Readers

Dr. David J. Francis, professor of psychology and director of the Texas Institute for Measurement, Evaluation, and Statistics at the University of Houston, presented guidelines and principles of research design to keep in mind when designing a research agenda and developing a grant proposal. Several overarching considerations are that it is helpful to have a view that is expanded over the traditional view of conditions of observation—think about who are the subjects, how they get selected, and how they get assigned to conditions. Studying adolescents does not preclude any designs, but interest in certain phenomena might limit the number of useful designs.

Scientific questions should drive all the aspects of design. Several criteria apply to a good study design. First, the design should have internal validity—can cause and effect be inferred, and to what extent does the study reduce uncertainty about cause and effect? When feasible, randomization is preferred; although it does not guarantee strong internal validity, it does eliminate common threats. For descriptive studies, qualitative study design might be the best approach. Second, external validity is the extent to which one can generalize beyond the specific situation of the study—to other settings, at other times in history, at different times in the school year, in a different context. Dr. Francis warned that it is difficult to maximize internal and external validity in the same study—this is a constant trade-off requiring careful decisions regarding design, which must be made with the research aims in mind. Early studies might try to identify common characteristics, and later studies would push for internal validity. Third, statistical conclusion validity refers to whether or not the evidence implies a true relationship (not necessarily a cause-and-effect relationship) between independent and dependent variables. Have the data been analyzed correctly? It is important to understand the nature and limits of the statistical methods used.

Good design is a challenge of making difficult choices. The following are a number of questions Dr. Francis presented to consider in designing literacy studies. The specific answers to any of these questions will depend on many factors, but the answers should be driven by the aims of the research:

- Who will be assessed? What is the definition of "adolescents"? Will age, grade, psychological indicators, biological markers be included? What is the definition of "struggling adolescent reader"? Is there an acceptable, definitive taxonomy of reading failure?
- What will be assessed? What skill domains need to be assessed? Only those likely to be affected by the treatment, or also skills not likely to be affected by the treatment? Proximal and distal effects of the treatment?
- What needs to be measured? Which components of reading? Word-reading accuracy? Fluency—for connected or decontextualized text? Vocabulary—or oral language proficiency more broadly conceptualized? Which components of reading comprehension? Silent or oral (or both)? Listening or reading (or both)? Background neutral, or background knowledge assessed independently? What level of inference—text level, knowledge integration,

knowledge acquisition?

- What kind of assessment/observation is needed for each academic and behavioral domain of interest? Norm-referenced tests or criterion-referenced tests? Growth measure? In what language(s)? Individual or group administered? Paper and pencil, performance-based, survey/self-report? Coded observations of teachers, of students, of interactions? Measures of treatment fidelity?
- What else will be assessed? Instruction (what aspects; in what contexts)? Motivation (intrinsic, extrinsic, both?) Engagement (self-report, observation)? Are these skills or factors which mediate or moderate the effects of treatment?
- When and how often will assessments occur? Beginning of year and/or end of year? Multiple times per year? What is the window of opportunity for assessment—i.e., how much time can elapse between the assessment of the first subject and last subject at a given occasion of measurement? Before treatment begins? If so, how many times before treatment begins?

Designs for High-Quality Interventions

Dr. Virginia Berninger, professor of education psychology at the University of Washington, discussed contributions to research on literacy that are possible by using controlled experiments (random assignment and control or comparison groups) and design experiments. She gave examples of both kinds of study. She reported the results of a study at the University of Washington in which children with dyslexia and good readers were imaged with fMRI before and after they participated in a controlled experiment comparing phonological and morphological treatment. She showcased Bernice Wong's school-based research on teaching writing to adolescents as an exemplary line of research using design experiment methodology, along with controlled research (procedures to achieve desired outcome).

Effective instruction, Dr. Berninger noted, has multiple components, and research studies can have multiple designs. The advantage of experimental, randomized control designs is that one can draw inferences about causality. The advantage of design experiments is that one can bring about desired outcomes. It is possible to combine design experiments and randomized control group experiments by systematically varying one component while keeping other components constant.

Dr. Berninger drew a number of conclusions from the fMRI studies she presented: explicit training in alphabetic principle is necessary for beginning reading acquisition and preventing severe reading disabilities; in later reading development, morphological treatment is necessary; morphological treatment affects the rate of phonological decoding, and resulted in greater fMRI brain changes than did the phonological-only treatment in older dyslexics; the brain is both an independent variable (constrains response to intervention) and a dependent variable (changes in response to intervention); dyslexia in older students is treatable but not necessarily curable. While experimental research is needed to validate instructional design principles, implementation research is also needed to evaluate the application of research findings.

Discussion Period

During the open discussion, the following comments were made.

- Dr. Berninger pointed out several priority research needs: integrating reading and writing instruction in teaching domain-specific content knowledge, instructional decision-making of teachers, and restructuring of schools as learning environments. In concluding, she emphasized that literacy in the information age occurs in a

sociocultural, political context. Students and teachers are bombarded with "infotainment" and need to learn that some literacy goals require sustained, motivated mental work. Students also need to learn to become critical consumers of "information" and evaluate its validity. Students need to acquire "information literacy" for effective use of libraries and technology resources in the 21st century.

- Most schools are teaching phonics to older students with reading problems. They are not necessarily teaching phonological awareness of the sound structure of spoken words or morphological awareness of the meaning units in spoken and written words. Older students need to coordinate orthographic, phonological, and morphological awareness in word learning.
- Developing and implementing interventions for adolescent literacy involves essential learning and teacher preparation in any subject area. It is getting science teachers to do something that is fundamental to learning in any area.
- It is powerful to fuse concepts in such a way that students are not in a specific content area class. Rather, they are in a learning mode—learning, reading, communicating. The measurement of comprehension will require capturing that learning growth.
- It is important to look at both the proximal and distal outcomes.
- What are the ways of using texts, reading, and writing that are particular to each subject area? The students need mediating tools. Content areas represent different cultures. Teacher education has not investigated this at all.
- One participant questions how research can be done ethically if there is a control group. There is an ethical concern only if there is an intervention known to be effective. Two options are to use a group wait-listed for intervention as a control group, or to use a second intervention known to be effective.

Adolescent Literacy Home

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